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Initiatives for Clean and Green Indian Navy

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By Rear Admiral Dr. S. Kulshrestha (Retd.)
Indian Navy

Image Attribute: Two aircraft carriers of the Indian Navy - INS Vikramaditya and INS Viraat / Source: ***Wikimedia Commons***

On February 12, 2017, INS *Sarvekshak*, a survey ship of the Indian Navy had completed installation of a 5KW solar power system on board [1]. It is estimated that in this project, the profit generated would be Rs. 2.7 Cr, taking the service life of the ship to be about 25 years. This solar power installation avoids 60,225 kg of carbon a year and saves 22,995 liters of diesel.

Green Energy Generation Options to Defense Forces

Green Energy options that are available to defense forces depending upon their geographical locations include a combination of the following:

Solar Energy

Solar energy is being utilized by the forces to reduce the load on traditional generators. Solar energy can be generated using both fixed and portable solar systems to provide a clean source of energy, especially at remote locations. This also helps in reducing the number of costly and at times dangerous fuel re-supply missions. With the rapidly reducing costs of PV cells, the rates of solar power are highly competitive. Further, since the PV cells are much lighter they can be easily carried on the backpacks in the battlefield.

Biomass

Developments in Biomass have resulted in corn-based ethanol and soybean or canola based biodiesel. Lately, however, there is the shift away from food crops for generating fuel towards the use of lignocelluloses feed stocks and energy crops that can be grown on wastelands. The biomass to liquids (BTL) includes synthetic fuels derived thermo-chemically via biomass gasification and cellulosic ethanol produced biochemically. The production of ***Fischer-Tropsch Liquids (FTL)***[2] from biomass is

considered advantageous over cellulosic ethanol.

Fuel Cells

Fuel cells are one of the most efficient techniques for power generation and an alternate to petroleum. They can function on a number of different fuel sources like biogas, hydrogen, or natural gas. They also provide a scalable advantage from megawatts down to a watt, which enables meeting a large variety of applications for the forces. They can power transportation systems on land and sea, provide power in remote areas, act as power backups, assist in distributed power, and so on. The byproducts of fuel cells are water and heat since they directly convert chemical energy into hydrogen to electricity. They are also highly efficient with conversion in the range of ~60%, which is nearly twice that of conventional sources.

Waste to Energy

Municipal Solid Waste (MSW) can be converted to energy in three ways, namely, pyrolysis, gasification, and combustion. These processes are differentiated by the ratio of oxygen supplied to the thermal process divided by oxygen required for complete combustion. It has been observed that a localized approach to generating energy from waste is beneficial as compared to a large facility located miles away. This helps in reducing the overall carbon footprint as well as facilities that do not look out of place.

Hydro-power

Investments in small hydro-power systems reduce the exposure to fuels considerably. Intelligently sited and planned systems assure clean and reliable energy over the years.

Marine Renewable Energy

A large source of renewable energy is presented by the oceans, in form of wind driven waves on the coast, ocean currents, ebbing and flowing tidal currents through inlets and estuaries, river currents, offshore wind energy and ocean thermal systems. All of these can be utilized for power generation by the forces.

Geothermal Power

It provides a number of advantages like it is uninterruptible, it is cleaner, it is an established technology, and is abundant. This is a highly suitable energy source for land-based establishments that have access to it.

Green Initiatives - U.S. Navy

The U.S. Navy had set the goals of energy efficient acquisitions, reducing the non-tactical petroleum use by 50 % by 2015 and sailing the Great Green fleet by 2016. Further, it had decided upon producing 50% of shore based energy from alternate sources, making 50 % installations net-zero by 2020, and lastly, ensuring that by 2020, 50% of its total energy requirements would be met from alternate energy sources.

The **Great Green Fleet Initiative** of the U.S. Navy. The Great Green Fleet is a demonstrator of the strategic and tactical viability of bio fuels. A strike group had embarked on a yearlong deployment in West Pacific in January 2016. The strike group (JCSSG) consisted of USS John C. Stennis with Carrier Air Wing (CVW-9) and Destroyer Squadron (DESRON) 21 embarked, guided-missile cruiser Mobile Bay and guided missile destroyers Chung-Hoon, Stockdale, and William P. Lawrence. CVW-9 consisted of Helicopter Maritime Strike Squadron (HSM) 71; Helicopter Sea Combat Squadron (HSC) 14; Airborne Early Warning Squadron (VAW) 112; Electronic Attack Squadron (VAQ) 133; Fleet Logistics Combat Support Squadron (VRC) 30, Detachment 4 and Strike Fighter Squadrons (VFA) 151, 97, 41 and 14 . The JCSSG had used alternate fuel (10 percent beef tallow and 90 percent marine diesel) and incorporated energy conservation measures. The Great Green Fleet initiative also included the use of energy efficient systems and operating procedures like changing of lights to solid-state lighting, temperature control initiative, installation of stern flaps to reduce drag etc.

Green Initiatives - Indian Navy

In order to reduce the carbon footprint of the Indian Defense Forces and associated establishments, the Government of India

has initiated considerable efforts under phase-II/III of the Jawaharlal Nehru National Solar Mission JNNSM. It includes setting up over 300 MW of Grid-Connected Solar PV Power Projects by Defense Establishments under Ministry of Defense and Para Military Forces with Viability Gap Funding under JNNSM. As per the annual report of Ministry of New and Renewable Energy (MNRE) for the year 2014-2015[4], some of the salient features of the scheme include:

- A capacity of 300 MW to be set up in various Establishments of Ministry of Defense with the minimum size of the project to be one MW. The defense establishments would identify locations for developing solar projects, anywhere in the country including border areas from time to time. The projects under this Scheme will mandatory put the use of solar cells/modules, which are made in India. The Defense organizations/Establishments will be free to own the power projects i.e. get an Engineering, Procurement, Construction (EPC) contractor to build the project for them or get a developer who makes the investment and supplies power at a fixed tariff of Rs.5.50 per unit for 25 years. The MoD or the Defense Organization would be free to follow their own procurement systems or develop detailed guidelines or procedures for tendering.
- An inter-ministerial group has recommended National Clean Energy Fund (NCEF) Support of Rs. 750 cr.

Indian Navy has completed three years of its Green Initiatives Program on World Environment Day in 2017. Smart LED lighting in Naval stations is also being adopted on its warships.Navy has undertaken a large number of green measures to reduce its overall carbon footprint. An Energy and Environment Cell[5] at Naval Headquarters have been created to monitor the implementation of the green energy programs. The Navy has initiated efforts to go green in ship designs as well as its operations. It also carries out mass awareness drives in its dockyards, and shore establishments to sensitize the personnel to energy conservation.

The Navy has set a target of 19 MW Solar PV installation,[6] in line with the National Mission of Mega Watt to Giga Watt towards achieving 100 GW Solar PV installations by 2022.Navy has also pledged 1.5 per cent of its Works budget towards Renewable Energy generation. Navy is exploring the feasibility of exploiting Ocean Thermal Energy and Wave Energy as sources of green energy.

About the Author:

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